SCIENCE

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FRIDAY, JULY 5, 1895.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison on Hudson, N. Y.
Subscriptions and advertisements should be sent to SCIENCE, 41 N. Queen St., Lancaster, Pa., or 41 East 49th St., New York.

THE NEW YORK BOTANIC GARDEN.

OUR country is to be heartily congratulated on the prospect that New York may soon be in possession of a Botanic Garden of the first order. The subscription prerequisite to the issue of municipal bonds has now been completed. It remains for the city to carry out its part of the agreement, by raising $500,000 for building purposes and by providing 250 acres of land in Bronx Park or other suitable place. This action will probably be taken without unnecessary delay. Hence we may look forward with confidence to the speedy establishment, on a comprehensive and dignified scale, of a Botanic Garden of which the city and State may rightly be proud. But this successful effort has far more than a local interest or significance. It concerns the whole country.

To Columbia College and the other educational institutions of New York and vicinity, this new appliance for instruction will mean indeed a great deal. To all the citizens who are to take advantage of the

opportunities for instruction which the Garden will afford, Bronx Park will be a constant delight. But far beyond these limits, wide as they are, the Garden will exert a profound and beneficial influence. Other cities will surely be stimulated by this noble movement and enrich their park systems with an educational aid of the greatest value.

Formerly Botanic Gardens, attached even in a remote manner to educational institutions, were largely used for the cultivation of medicinal plants and for the reception of species from distant lands. Of course, this use, although its importance is now relatively less than ever before, will still long continue to be a factor in the direction of activities. But here and there new phases of plant relations are being displayed in the greater gardens, and with the most gratifying results. Geographical questions are asked and answered by skilful grouping of species, and in the most attractive way. The bearing of climate on the structure, habit and possibilities of plants is made prominent in an interesting fashion. The capabilities of useful plants and the extension of their range of usefulness comprise another phase of illustration which always sets visitors to thinking. Beyond and, we may say, above these questions, which are pretty strictly utilitarian, there comes nowadays another class of illustrations which are of the highest educational value in a community, namely, the biological features which are invested with such important relations to all departments of intellectual activity. The manifold relations of plants to their surroundings and to other organisms constitute in some of the botanical gardens of the present day the most attractive sections. The special interest in this can be more plainly seen if attention be called to the groups of climbing plants. Think of reading Darwin's work on climbing plants with the living illustrations before one! This is only one of many stimulating exhibitions in a garden adapted to modern wants.

The Arnold Arboretum, a department of Harvard University and an adjunct of the Boston Park system, has become one of the most charming places for certain studies of a general nature within reach of the public of Boston. And yet it is confined chiefly to woody plants. Without such limitations the New York Garden may, perhaps, offer even a wider field for general study to the public now so eager to learn something about nature at first hand.

With the secure foundation of the New York Garden, three of our cities will be well provided with botanical establishments of the highest class. We venture to hope that many other cities will soon emulate the example of Boston, St. Louis and New York.

George Lincoln Goodale.
Harvard University.

THE SUBMERGENCE OF WESTERN EUROPE PRIOR TO THE NEOLITHIC PERIOD.

The veteran geologist and archæologist, Professor Joseph Prestwich, has recently contributed a suggestive memoir on this subject to the Philosophical Transactions of the Royal Society.* It treats of 'the evidence of a submergence of Western Europe and of the Mediterranean coasts at the close of the glacial or so-called post-glacial period and immediately preceding the neolithic or recent period,' and is accompanied by an original map showing the chief areas submerged.

The memoir deals in turn with the character and distribution of 'rubble drift' loess, breccia, ossiferous fissures, raised breaches, bone caves, shell beds, and presents the results of many years research over this wide field. In a previous paper, communicated to the Geological Society of

*Vol. 184, 1893, A., pp., 903–984. Plate 33. Price 5 s. 6 d.

London in 1892,† the author gave the evidence deduced from personal observation of the submergence of the south of England not less than 1000 feet between the glacial or post-glacial and recent or neolithic period and proposed the term 'rubble drift' for the peculiar superficial drift then deposited. In the memoir under notice Professor Prestwich cites the phenomena he relies on as proofs of this submergence in England and traces their extension over large continental areas.

The author describes the 'rubble drift' as sometimes simulating other drift deposits, but maintains that it cannot be included with them on account of its varied physical distribution and faunal divergences. It is distinguished chiefly by the absence of all marine and fluviatile shells; the included remains are those of land animals and land shells alone, and of land plants derived from a land surface only. He points out that mammalian bones from the ordinary Quaternary deposits are very fragmentary, characterized by the absence of wear and also devoid of traces of gnawing in contradistinction from those of the caves, 'which have commonly been gnawed by predaceous animals,' and from those of the fluviatile deposits, which are usually worn.

The *detritus* of the 'rubble drift' is always of local origin, and as a rule unstratified. Professor Prestwich considers therefore that it can only be accounted for by an upheaval of a submerged land surface after widespread submergence, the consequent divergent effluent currents of water sweeping the detritus of the submerged surface from the higher to the lower levels. "A body of water 1,000 feet deep forms an engine of enormous power." He maintains that all the phenomena of this 'rubble drift' are explicable only upon this hypothesis.

The 'rubble drift,' widely, if sparsely, spread over the Southeast of England, can be traced over much of western Europe and the Mediterranean coasts. It has been personally observed by him in parts of France and Italy. Other geologists have noted similar phenomena elsewhere without attempting to account for their origin. Professor Prestwich holds it to be impossible that the confusing accumulations of superficial debris lying on the surface of the land without apparent order or stratification could all be due to the *transient* action of water, and that glacial, fluviatile and meteoric action fail to account for *all* the phenomena. To the residue he applies the name of 'rubble drift,' as distinguished from the term *diluvium*, which is still variously employed on the continent to denote fluviatile, sub-ærial and other drift beds, and does not include the more important phases of the 'rubble drift' period, "which marks the last stage of a long series of earth movements of variable intensity and duration." "Whilst admitting the permanence of the laws of nature, it is impossible to suppose that at all former periods the effects produced by these laws, though not equal in kind, were equal in degree."

The absence of marine sediments in the 'rubble drift' is not to be regarded as fatal to his theory if the submergence were of short duration, which would also militate against the migration and establishment of a marine fauna on the submerged area. All the component materials of the 'rubble drift' are of local origin. It includes remains of a land fauna alone, the mammalian bones are ungnawn yet sharply fractured. The submergence hypothesis he includes not only 'meets the requirements of each particular case, but shows them all to be concordant, and such as would pertain to one common and general cause.'

Professor Prestwich thus proceeds to restate his long-held convictions that Croll's estimate of the lapse of 80,000 years since the close of the glacial period is not sup-

† Quarterly Journal Geological Society of London, vol. 48, p. 263. 1892.

ported by geological facts, nor the history of the development of human culture. Progessive early quarternary man could not have remained stationary for 70,000 years without advancing further than the status attained by 'man of the early stone period.' "There is nothing to represent geologically that long period of time, nor have biologists been able to detect any essential structural differences between paleolithic man and neolithic man in support of such a conclusion; all the evidence tends, on the contrary, to prove that late glacial (or post-glacial man), together with the great extinct mammalia, came down approximately to within some 10,000 to 12,000 years of our own time, and that the 'rubble drift' marks the stroke of the pendulum when the glacial period came to a close and the Neolithic age 'commenced.'"

It is well known that the stern repression of the physicists has compelled the majority of geologists and biologists to make considerable reductions in their estimates of the duration of geological time and of the ages requisite for the evolution of life on the earth. These conjectures have varied from Mr. J W McGee's revised maximum of six thousand millions of years to Professor Winchell's modest minimum of three millions. Mr. C. D. Walcott, who has recently passed this subject in review (American Geologist, December, 1893), came to the safe conclusion that "the earth is very old and that man's occupation of it is but a day's span compared with the eons that have elapsed since the first consolidation of the rocks with which the geologist is acquainted."*

With regard to the approximate duration of this 'span,' however, quarternary geologists and archæologists are by no means agreed. Mr. Warren Upham would extend its limits to 100,000 years at least. Professor Prestwich would make it much shorter. He ascribes from 15,000 to 25,000 years to the glacial epoch, and to the post-glacial period at most 10,000 years; from 20,000 to 30,000 years in all to paleolithic man. (Quart. Journ. Geol. Soc., London, p. 407 Vol. 43, 1887).

Historic archæologists, on the other hand, are daily accumulating evidence that the dawn of civilization was remote from our era, that the arts and sciences began long, long ago. Drawing, painting, sculptures, writing, calculating and astronomical observations were fully developed and widespread at the earliest historical period, and their origin lies far beyond our ken. The researches of Prof. Norman Lockyer have revealed a knowledge and practice of the elements of astronomy in the Old World as far back as the history of Egypt and Asia Minor can be traced, while those of Mrs. Zelia Nuttall on 'the calendar system of the Ancient Mexicans' have demonstrated the hitherto unsuspected facts that such knowledge was developed and observations practiced in the New World at an almost equally remote period of time.

Of a truth there is no finality about science. The enunciation of modern theories postdating the antiquity of man coincides with facts antedating the dawn of human civilization. Unless we may assume with Professor Prestwich, that the two periods overlapped in Europe and Asia, that while man in a more advanced state flourished in the East he may have been in one of his later post-glacial stages in the West, or are permitted to apply to human culture the principle of 'accelerated development' so dear to American biologists, the reconciliation of two such apparent contradictions must still be left a 'Problem of the Future.'

Agnes Crane.

Brighton, England.

* The majority of estimates now range from fifty to ninety-five millions, more than one hundred millions less than Darwin suggested as the age of the world.

THE GENERIC NAME OF THE WATER-WEED.

THE first generic name applied to our common Water-weed or Ditch-moss was *Elodea*, published by Michaux (Fl. Bor. Am. I: 20. 1803), who gave a description accompanied by a figure of the North American plant specifically designated by him *Canadensis*. This name was unavailable on account of the prior publication of *Elodes* Adans. (Fam. Pl. 2: 444. 1763), the same word with a different spelling. Adanson's genus was based on *Hypericum Ægypticum* Linn.; it has been accepted by Payer (Organog. 8, pl. I.). *Hypericum Ægypticum* was also made by Spach the type of the genus *Triadenia* (Ann. Sci. Nat. II. 5: 172) as *T. microphylla*. It is noteworthy that Spach in the paper above cited credited Adanson with the name *Elodea* and founded a new genus *Elodes* in addition, thus complicating the synonymy of these Hypericaceæ in an extraordinary manner.

Elodea Michx., being thus clearly untenable, authors have at different times proposed no less than six generic names for the Water-weeds. In seeking for the oldest of these, Morong (Mem. Torr. Club, 5: 27) has recently accepted *Udora* Nutt. (Gen. 2: 242. 1818), but *Philotria* Raf. (Am. Month. Mag. 2: 175. Jan. 1818) was published a few months earlier, and appears to be the first available for these plants. The North American species is *Philotria Canadensis*= *Elodea Canadensis* Michx.

N. L. BRITTON.

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*NOTES ON THE PROGRESS OF ASTRONOMY DURING THE YEAR 1894.**

MINOR PLANETS.

TWENTY-THREE new planets were discovered. Permanent numbers have been assigned from 379 to 390, both inclusive. Eleven have, as yet, been unnumbered, as the investigations in regard to their orbits are not sufficiently complete.* The discoverers were as follows: Charlois at Nice 11, Courty at Bordeaux 2, Wilson at Northfield, Minn., 1, Wolf at Heidelberg 6, Bigourdan at Paris 1, Borelly at Marseilles 1, Roberts at Crowborough 1.

Minor planets are now picked up so rapidly by photography and other methods that, to avoid confusion in the numeration, Prof. Kreuger, of Kiel, assigns a provisional rotation (A, B, C, etc., BA, BB, BC, etc.), arranged in order of their announcement to the 'Telegraphische Central-Stelle.' The final number is assigned by Prof. Tietzen, Director of the Rechen-Institut in Berlin. Numbers are assigned to those planets only for which sufficient observations are available for a determination of the orbits. Names are given by the discoverers.

Planet BE discovered November 1, 1894, by Wolf, is unique, having the smallest perihelion distance of all the minor planets, except possibly No. 323, Brucia, which was named after Miss Bruce of New York City, on account of her generous contribution to astronomical work. The least distance of BE from the earth and Mars are about 63 and 21 millions of miles. It seems to be well adapted for determining Solar Parallax.

Prof. E. E. Barnard measured, during the year, the diameters of Ceres, Pallas and Vesta with the great telescope of the Lick Observatory and obtained the results as follows: Ceres, 520 miles; Pallas, 304 miles; Vesta, 241 miles. These planets are the largest of the family.

COMETS.

Five comets were discovered.

(*a*) Denning, of England, picked up the first on March 26, 1894.

Investigations seem to show that this

* Based mainly upon the *Annual Report of the Royal Astronomical Society of London*. February, 1895. Prepared at the request of the responsible editor.

* Numbers have since been assigned up to and including 401.

comet makes a close approach to Jupiter (about 18,000,000 of miles). The orbits of Brorsen's and Denning's comets appear to intersect. Brorsen's comet passed the intersecting point February 7, 1881, and Denning's comet reached that point March 14, 1881. Perturbations may bring about a collision.

(*b*) On April 3, 1894, the second comet was found by Gale, of New South Wales. He used a telescope with object glass only 3 inches in diameter. The comet had a tail 4° in length. Prof. Barnard has studied this comet with unusual care and taken some exquisite photographs which reveal many details deserving most careful investigation.*

Twenty lines were seen in the comet's spectrum. The orbit seems to be a parabola.

(*c*) By the aid of an ephemeris prepared by Schulhof, this second return of Tempel's comet, first seen in 1873 and observed in 1878, was found by Finlay at the Cape of Good Hope on May 8. The error in the assigned place was only 9 seconds of time in right ascension and 30 seconds of arc in declination. This discovery is a 'recovery' of a comet after sixteen years.

The comet has a period of 5.2 years and is one of the fifteen periodic comets of which at least one return has been observed.

(*d*) Encke's comet belongs in the same class with the preceding comet and is one of the most interesting objects to the astronomers. It was originally discovered by Pons, of Marseilles, November 26, 1818. Professor Encke worked out its orbit and found it to be $3\frac{1}{4}$ years, or 1208 days, the shortest period of any known comet. It showed a continued acceleration in its motion to 1868, so that the time of each revolution about the sun was shortened by about $2\frac{1}{2}$ hours. After 1868 the acceleration appeared to be diminished by one-half.

*See *Astronomy and Astrophysics* for June, 1894.

The cause of this peculiar acceleration was first thought to be due to a 'resisting medium' in space or near the sun, but that theory is now abandoned and the idea is gaining ground that there is some undetected perturbation due to planetary attractions.

The thirty-third return of this comet was discovered independently by three observers, Perrotin at Nice, Wolf at Heidelberg and Cerulli at Teramo, on October 31 and November 1. All these astronomers were aided by the ephemeris calculated by Backlund.

(*e*) E. Swift, son of Lewis Swift, formerly of the Rochester observatory but now located in California at the Lowe Observatory, discovered on November 21st the last comet of the year 1894. There seem to be good reasons for believing this comet to be the 'lost or mislaid' comet found by De Vico at Rome, August 22, 1844. It was expected to return in 1850, but 'failed then and subsequently to keep its appointment.'

SOLAR PARALLAX.

Dr. Arthur Anwers published Volume V. on the *German Heliometer Observations of the Transits of Venus, 1874 and 1882.* In this volume the discussion of the observations is given. The final value of the Solar Parallax from the two transits is $8.''896 \pm 0.''0216$. This corresponds to a distance of 91,000 000 miles. This value differs considerably from the value 8.''81 obtained by Harkness in 1891.*

MARS.

This planet was in better position for observation during the opposition of 1894 than that of 1892, although the planet was farther from the earth. Observers have noted that the south polar spot completely disappeared; that during the gibbous phase there were irregularities seen at the termin-

**Solar Parallax and its Related Constants.*

ator which indicated mountains; that the canal system of Schiaparelli was generally confirmed, as well as the duplication of a number of the canals.

Excellent work was done by the observers at the Lowell Observatory Flagstaff, Arizona, in detecting additional canals and delicate details.

Some of the results of Mr. Lowell's expedition to Arizona have been published in the *Astrophysical Journal* for May, 1895.

Evidence has been obtained that at times vast areas are densely obscured by clouds. Several observers agree in noting that actual changes have taken place since 1877.

Professor Campbell, of the Lick Observatory, made observations of the spectrum and has found no lines due to an atmosphere on the planet Mars.

This is in opposition to other evidence. Campbell's apparatus was more powerful than that used by the other observers.

JUPITER.

The new satellite of Jupiter is so small and its proximity to the parent planet is such that the satellite can be measured only in the largest telescopes.

Barnard was able to make at the Lick Observatory observations which make a good basis for a more accurate determination of the orbit. The periodic time is $11^h\ 57^m\ 22^s.618 \pm 0^s.013$. The orbit is eccentric. Tisserand has shown that the major axis should make a complete revolution in about five months. Barnard prefers the name Satellite V.

Barnard sees on Satellite I dusky poles and a bright equatorial belt. These observations seem to explain the ellipsoidal and double appearances reported by other observers.

DOUBLE STARS.

The British Royal Astronomical Society presented in February, 1894, its Gold Medal to S. W. Burnham, formerly of the Lick Observatory, for his discoveries, measures and general work on Double Stars. In volume II. of the Publications of the Lick Observatory is given a great proportion of Burnham's recent work.

At the Georgetown College Observatory experiments were made with a 12-inch refractor. Fifteen wide pairs were photographed. The results of the measures were not encouraging.

During the year Prof. Glasenapp published his observations of 1220 measures on 610 pairs, made at Abastouman.

The orbits of ten double stars were computed and published during the year. The periods vary from 11.37 years, in the case of *K* Pegasi to 208.1 years for η Cassiopeiæ.

NEBULÆ.

In *Astronomy and Astrophysics* for May Prof. Campbell, of the Lick Observatory, gave a table of bright lines photographed in the spectrum of the Orion nebula; of dark lines photographed in the spectra of the Orion stars and of the comparison of bright nebular and dark star lines. He concludes that nearly all the dark lines in the faint stars are matched by bright lines in the nebula, but certain prominent nebular lines are not matched by dark stellar lines.

The stars appear to be closely related to the nebula in chemical constitution and may be physically connected.

Prof. Keeler, from his observations at the Lick Observatory,drew the conclusion that the distance of the great Orion nebula from the sun is increasing at the rate of 11 miles per second. No relative motion of the different parts of the Orion nebula was detected. His investigations seem to show that nebulæ are moving through space with velocities similar to that of the stars.

POTSDAM PHOTOMETRY.

Drs. Müller and Kempf have completed, in its first stage, the investigation of the

visual magnitudes of all stars recorded as fainter than 7.5 magnitude in Argelander's Durchmusterung, lying in the zones between north declination 0° to 20°. In a few years they hope to complete the investigation to the North Pole.

This research is the most accurate and complete of modern researches in the direction of photometric study of stellar magnitudes.

ASTROPHOTOGRAPHIC CHART.

Seven of the associated observatories have taken more than one-half the required catalogue plates. All these plates will be taken in two or three years.

The measurement of the catalogue plates was begun at the Paris Observatory.

The chart plates will not be completed probably until 1900.

ASTRONOMICAL PHOTOGRAPHY.

In volume III. of the Lick Observatory publications are reproduced several fine enlargements of lunar photographs taken with the 36-inch refractor cut down to eight inches. These enlargements were made by Dr. L. Weinek, of the Prague Observatory. In addition Dr. Weinek has published some excellent enlargements of moon photographs taken by M. M. Loewy and Puiseux at Paris.

In February, 1895, the Royal Astronomical Society presented its Gold Medal to Dr. Isaac Roberts for his photographs of star clusters and nebulæ published in 1894. These superb photographs were taken with silver-on-glass reflector of 20-inch aperture and about 100 inches focal length. Professor Barnard, of the Lick Observatory, exhibited, at the R. A. S., an exquisite set of sixty positives, on glass, of stars and comets. The publication of these photographs is under consideration by the Society. The Council of the R. A. S. is also at work on a method for reproducing the fine photographs recently made and for making the reproductions permanent.

VARIATION OF LATITUDE.

Dr. Chandler showed that there are two terms in the variation of latitude. One term with a period of a year, the other with a period of 428.6 days. He suggested that the pole rotates, not in a circle, but in an ellipse with revolving line of apsides.

During the year there was published the results of observations made in various parts of the world, including Prof. Doolittle's work at Bethlehem, Pa., and Prof. Davidson's observations at San Francisco.

NEW OBSERVATORY.

Mr. Percival Lowell, of Boston, established an observatory at Flagstaff, Arizona, at an elevation of 7,300 feet above sea level. His principal instrument was formed by a combination of two telescopes with apertures of 18 and 12 inches. These telescopes were mounted like a twin instrument.

Mr. Lowell, Professor W. H. Pickering and Mr. Douglass have given most of their time to the study of Mars. Extensive reports have been made in *Astronomy and Astrophysics*.

J. K. Rees.

Columbia College.

CURRENT NOTES ON ANTHROPOLOGY (X.).

IS CRANIOLOGY A SCIENCE?

Two years ago (June, 1893) I pointed out in these notes how completely craniology, as it has been pursued, has failed of the promises which Broca and Retzius and its other founders made for it.

A far more forcible and detailed indictment of its inefficiency has just appeared from the pen of Professor Burel von Török, Director of the Anthopological Museum at Budapest, himself an eminent craniologist, in the 'Archiv für Anthropologie,' Band XXIII. He says of the science: "All the great possibilities which were attributed to

it have proved illusory." The causes of this utter failure he finds mainly in the false methods which have been pursued; and partly in expecting from it results which in the nature of things it could never reach.

He does not give it up as worthless, but suggests more minute and extended investigations and measurements, reduced by mathematical formulas to averages and means, which will indicate probabilities, the higher as the observations are extended. He exemplifies his suggestions by several collections of Aino skulls, which he endeavors to analyze by numerous and extended calculations.

No one can deny the justice of his criticisms, and in a general way we must grant the correctness of his procedure; but, after all, it seems to me that his own method of means lacks the necessary noting of the frequency of extremes; in other words, it fails just as the mean temperature, monthly or annual, of a locality is practically no guide whatever to its climate, and fails for medical purposes. The range, daily and weekly, etc., is the only temperature test. The analogue to this, if I apprehend his method, Prof. von Török does not give in craniology. His article, however, is most important as pointing out present deficiencies.

A STUDY OF THE GUAYCURU.

A BOOK which is at once a 'thing of beauty' and a work of solid instruction is one by Guido Boggiani, entitled 'I Caduvei; Viaggi d' un Artista nell America Meridionale' (Roma, Loescher & Co. 1895). The Caduvei are the Indians of the Chaco, better known as the Guaycurus, among whom the author spent many months studying their habits, arts and mode of life. He presents his observations in a pleasant literary form, and his pages are adorned with more than a hundred admirable illustrations, while a well-drawn map enlightens the reader as to the geographical relations of the journey. So much in the latter direction is new that the Geographical Society of Italy has officially joined in the publication.

The Americanist is especially benefited by an 'Historical and Ethnographical Study,' by Dr. G. A. Colini, added to the volume. It presents a well-arranged vocabulary of the dialect, with remarks on its grammar and affiliations, and a review of what previously has been written about them. The art designs of the tribe are especially interesting and are exemplified by numerous illustrations.

WHY THE JAPANESE CONQUERED.

THIS is the title of an article by Otto Ammon in the *Naturwissenschaftliche Wochenschrift*, March, 1895. It is appropriate for comment here, because the author announces that the true answer is an anthropologic one; the Japanese conquered because they had a class of nobles, who were the virtual rulers of the nation, and who were of another and higher race than the lower classes. For this statement he quotes Dr. Doenitz and Professor Baeltz; and from what higher race, think you, they are descended? From the Semites! Not the 'ten lost tribes,' as one would naturally suppose, but from the ancient Akkadians of Babylonia!

This higher type he defines as narrow faced and with long skulls (dolichocephalic). Generalizing further, the author finds that in Europe, too, the higher type has these characteristics. The finest examples are naturally among the Germans, and the best of all was old General Von Moltke himself. The author indulges in gloomy anticipations about France, because it has destroyed the power of the old nobility, and about the present condition of Europe generally, because the political influence of the higher classes is diminishing, and individuals of a

lower ethnic type are coming to the front in statesmanship.

It is not likely that many citizens of the United States will deeply sympathize with our author in this anthropological pessimism. D. G. Brinton.

CURRENT NOTES ON PHYSIOGRAPHY (XI.).

PHYSIOGRAPHY OF CUBA.

Much excellent physiographical material may be found in R. T. Hill's recent 'Notes on the Geology of the Island of Cuba' (based on a reconnoissance made for A. Agassiz; Bull. M. C. Z. xvi., 1895, 243-288, maps and plates). One chapter, entitled 'Geologic history recorded by the topography,' is an excellent example of physiographic methods, which the author knows so well how to employ. The mountains of the interior are described as residual masses rising above a dissected peneplain; while the coast, especially around the eastern end of the island, is fringed with sea-cut benches terminating inland in strong sea cliffs. Hill differs from certain other writers in not regarding the ragged outline of Cuba as indicative of submergence, no downward movement being proved since the beginning of Tertiary time.

GEOLOGIC ATLAS OF THE UNITED STATES.

The folios of maps and text issued by the United States Geological Survey are providing sound physiographic descriptions of various parts of the country. One of the latest, the Estillville sheet, including parts of Kentucky, Virginia and Tennessee, by Campbell, classifies the surface forms with reference to the two well-marked peneplains that have been produced in the Appalachian province: the Cretaceous peneplain of the now dissected uplands; the Tertiary peneplain of the valley floors, now trenched by the rivers. The head of Powell's valley, included in this map, is a region of remarkable geological and topographical interest, well adapted to summer field-work for the geological students of southern universities. It may be noted that in naming the three main divisions of the Appalachian province, Campbell does not employ the usual term, Alleghany plateau. While the central division is all included in the 'Appalachian valley,' comprehending the linear ridges as well as the associated lowland, and while the diverse forms of the eastern division are named the 'Appalachian mountains,' yet the western division is called 'the Cumberland plateau *and* the Alleghany mountains;' no general name being here suggested. It seems unfortunate that the many similar features of this division should not be taken as sufficient reason for giving it some single general name, under which sub-divisions might be afterwards recognized when needed.

DE LAPPARENT ON GEOMORPHOGENY.

Professor A. de Lapparent, president of the Société de Géographie at Paris, contributes an article on *La Géomorphogénie* to the *Revue des questions scientifiques* for April, based in good part on American writings on this subject. He applies the physiographical methods to certain French problems, calling especial attention to the diversion of the Moselle from the Meuse to its present course below Toul. Few foreign writers have shown so full an appreciation as is here manifested of the systematic sequence that characterizes the development of topographical forms during the long process of baselevelling a region.

BIBLIOTHECA GEOGRAPHICA.

The *Gesellschaft für Erdkunde* of Berlin has for many years published in its *Zeitschrift* an annual summary of geographical literature prepared by its secretary, Dr. Koner, from 1853 until his death in 1887. The summary was continued for 1887 and 1888 by Fromm, for 1889 by Wolfsteig, and for 1890 by E. Wagner. Twenty-five years

ago, the list filled 90 pages; ten years ago, 130 pages; for 1890, 270 pages. With the recent changes of editors, the preparation of the lists was much delayed; and hence it has recently been decided to issue an independent bibliography, the *Bibliotheca Geographica*. Its preparation was placed in the hands of O. Baschin, and the first number for 1891 and 1892 has been recently issued in an octavo volume of 506 pages. Another number for 1893 will soon appear, and thenceforwards regular annual volumes will follow. The titles are carefully classified, first under various subdivisions of mathematical, physical and other general aspects of geography, then by countries. Presumably on account of the great amount of space demanded for even the briefest abstracts or critical notices, and probably also because the notices in *Petermann's Mittheilungen* suffice so well for the more important works, nothing but the author's name, the title of his paper, and the reference to its place of publication are given, with abbreviated indication of maps, tables and illustrations. If the *Bibliotheca* can be uniformly prepared and promptly published, it will become a standard work of reference.

JAHRBUCH DER ASTRONOMIE UND GEOPHYSIK.

THE fifth number of this useful annual, edited by Dr. H. J. Klein and published by Mayer, of Leipzig, treats of publications of 1894 and shortly preceding dates. It contains critical abstracts of a good number of the more important books and papers; the headings which concern physiography being topographical form in general, volcanoes and earthquakes, coastlines, the sea, rivers, lakes, glaciers, and meteorology in various subdivisions. Although not intended to be a complete bibliographic reference book, this annual must prove valuable to those who wish for a condensed statement of the best new material on physiographical subjects.

GLACIAL LAKES OF WESTERN NEW YORK.

THE Mohawk valley and the basins of the Great Lakes lie in a subsequent depression that follows the strike of weaker strata (chiefly Silurian) between the old-land area of resistant crystalline rocks on the north and the uplands of harder Devonian and Carboniferous strata forming the Alleghany plateau on the south. When this region first rose from the paleozoic sea, the drainage probably followed the dip of the strata, from the crystalline old-land southward even to the plateau area, after the ordinary habit of streams extending their courses across young coastal plains; but this was so long ago and there has been on all accounts so good an opportunity of rearrangement of drainage lines in later time that the St. Lawrence system now diverts all the headwaters along the lateral line of escape opened on the weaker Silurian strata; and the southward flowing streams of the plateau are reduced to moderate length by progressive beheading. A temporary return to ancient drainage conditions was, however, made during the glacial period, when the subsequent lowland along the weaker strata was filled by ice, and a general slope southward from Canada was restored. Then for a time water was discharged as it was originally; the beheaded streams in the plateau gained short-lived headwaters, either flowing directly from the margin of the ice sheet, or through intermediate lakes which were constrained to overflow into the southward streams by the obstruction of the retreating ice wall on the north. It is the memorials of these lakes that Fairchild describes in a preliminary essay under the above title (Bull. Geol. Soc. Amer., vi., 1895, 353–374), with especial reference to their deltas and outlets. The paper is an admirable beginning of a study which we hope the author may pursue at length.

W. M. DAVIS.

HARVARD UNIVERSITY.

NOTES ON AGRICULTURE (IV.)

ARTIFICIAL POLLINATION OF SQUASHES.

Mr. L. C. Corbitt in his Bulletin (No. 42 South Dakota Experiment Station) upon squashes observes that in Dakota there is an abundant production of flowers of the squash plants, but 'an almost complete failure of fruit.' For two years he has been experimenting to find the cause and concludes that the failure is due to an absence of insects capable of transferring the pollen from the male to the female flowers. In their absence it is further demonstrated that profitable crops of squashes can be grown by resorting to artificial pollination. This pollination is best effected in the early morning and consists in touching the stamens of a male flower, picked off and held in the hand to the large fleshy stigmas of the pistillate flowers, which are, of course, left on the vines. It was found that 62 per cent. of the flowers thus treated produced fruit, while practically none will grow if left dependent upon nature for the transfer of the pollen.

PEANUT CULTURE.

The Office of Experiment Stations of the U. S. Department of Agriculture has reached the 25th number of its Farmers' Bulletin, and Mr. Handy in this issue condenses a large mass of facts upon peanut culture and uses. It is only within a few years that the peanut has become an important crop in this country, the climate of the Atlantic seaboard and the Mississippi Valley proving very congenial to it. Peanuts desire a fine soil, kept loose and free from all weeds. After the vines are lifted, the growers stack them for two weeks, when the pods are removed, placed in bags and stored in well ventilated sheds. The larger portion of the crop is sold by street venders, while some are used in extracting a peanut oil. The peanut is an interesting plant in that the pods mature underground while the ordinary pea does not.

SOME PLANTS THAT LOOK LIKE THE RUSSIAN THISTLE.

In Bulletin No. 39 of the Illinois Experiment Station, Mr. Clinton, the assistant botanist, brings out by means of text and engravings, some of the plant rogues that resemble the Russian Thistle, mentioned in a late issue of Science.

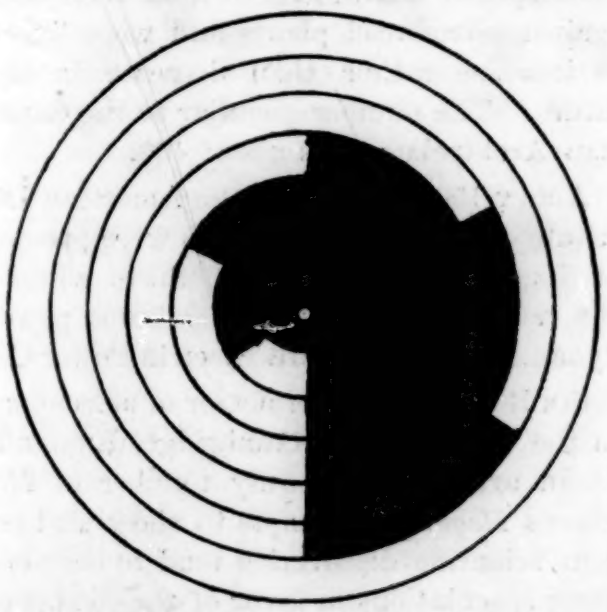
Among those of special mention are the winged pigweed (*Cycloloma atriplicifolium* (Sp.) Coult.), one of the plants of the Plains. It is easily distinguished from the Russian Thistle by its flat leaves of the ordinary sort. In the autumn this plant by breaking away from the soil at the root becomes one of the noted 'tumble weeds.' Another species of weed quite closely related to the last, and likewise a 'tumbler,' is the *Amarantus albus* L. It is not confined to the West, but may be found in many an Eastern neglected field. This Amaranth has a first cousin that is spinose (*A. spinosus*, L.), and for this reason is easily mistaken for the Russian pest. Somewhat more remote as regards botanical relationship is the Horse Nettle (*Solanum Carolinense*, L.), which is akin to the tomato, egg plant and potato. It has yellow pickles and berries. The Texan horse nettle or 'sand bur' is even worse than the last, to which it is closely related. It is *Solanum rostratum*, Dun. Of course, it would be a fault of omission not to mention the Canada Thistle in this connection, as it is one of the most despised of the prickly weeds. There is a prickly lettuce (*Lactuca Scariola*, L.), common in the West, that is like the Russian intruder, but easily distinguished from it by the flat leaves, which are polar, and the species is a compass plant.

Byron D. Halsted.

PSYCHOLOGICAL NOTES (I.).

THE SPECTRUM TOP.

RECENT numbers of *Nature* have contained not fewer than eleven communications on 'a spectrum top,' and the instrument has been extensively discussed in *La Nature*, *The Scientific American* and other journals. Yet none of the writers seem to know that the phenomena were described by Fechner in 1838 (*Poggendorff's Annalen*), and were given a careful quantitative study and correct explanation by Rood in 1860 (*Am. Journal of Science and Arts*). They have also been discussed and illustrated by Brücke (*Wiener Akad.*, 1864); by Aubert (*Physiologie der Netzhaut*, 1865), and by others. Indeed Aristotle described the colored images following the exposure of the eye to white light. In view of these facts, it is somewhat amusing to find that Messrs. Newton & Co. write to *Nature* (March 14, 1895) that anyone supplying the tops will be infringing their copyright.



The form used by Aubert is shown on the accompanying figure. If such a disk (best enlarged) be revolved 10 to 40 times per second colors will appear, varying with the rate of revolution, the intensity of the light, the observer, etc. Under favorable circumstances the colors may be of great brilliancy. They are undoubtedly subjective, being due to the fact that the components of white light vary in the time they require to call up a sensation, and in the time the sensation continues after the light has been withdrawn. But while we may refer these phenomena to inertia and fatigue, we are very far from having a satisfactory theory of all the facts of color vision.

'ANIMAL MAGNETISM.'

WHEN a work on hypnotism is issued as the thirty-fifth volume of a series of electro-technical primers, we do not look for a critical treatise. Nor do we find one in *Magnetismus und Hypnotismus* by G. W. Gessmann (Hartleben, Vienna). A full-page picture of 'Lina' in the attire and attitude of a Sybil, reading a closed book through the top of her head, is scarcely a part of modern electrical science. The work is in a way more interesting than others of the long series of articles and books describing in endless repetition the well ascertained phenomena of hypnotism—more interesting not only to the credulous, but also to men of science, owing to the historical references to Greek oracles, demonaic possession, miraculous cures, Reichenbach's 'od,' etc. Still such books do harm by making a subject notorious through the popular interest in the abnormal and the marvelous, and really prevent the scientific investigation of hypnotism and its use as a therapeutic agent. Experiments on hypnotism by untrained observers have much the same results as giving or taking 4 ounces of alcohol in order to study the phenomena of intoxication. Hypnotism, dreaming and somnambulism, intoxication, delirium, hysteria, insanity, etc., are related phenomena the study of which has thrown much light on the normal workings of the mind, but they are phenomena that can be studied to advantage only by students skilled in psychology, physiology and pathology. J. McK. C.

SCIENTIFIC NOTES AND NEWS.

ANCESTRY OF THE MAMMALIA.*

Professor A. A. W. Hubrecht recently presented a paper to the Amsterdam Academy of Science summing up his researches upon the origin and bearing upon the problem of mammalian ancestry of the Amnion. This fœtal envelope distinguishes the reptiles, birds and mammals from the Amphibians and fishes, yet Professor Hubrecht finds that the mode of development of the Amnion in some of the mammalia is even more primitive than that in the reptilia and can be theoretically derived from the outer epiblastic layer of the Amphibian embryo. He is thus led to support the hypothesis Huxley advanced in 1880, that the mammalia originated in a pre-reptilian, if not actually an Amphibian stock. Since, further, the three great divisions, Monotremes, Marsupials and Placentals show distinct modes of Amnion development, and among the latter the Insectivora are extremely primitive. He reaches the following conclusions as to the relations of the mammalia: that the three great divisions arose independently from a common Protamniote Amphibian-like stem; the theromorph reptilia are not to be regarded as transition forms to the mammals, but as parallel forms; the ancestry of the insectivora dates back to the time of origin of the monotremes and marsupials. He shows that his own conclusions based upon embryology are so far as concerns the polyphyletic origin of the mammalia, the mesozoic origin of the insectivora, and the parallel position of the theromorpha, in close agreement with the paleontological position of Miart, Osborn and Baur, while as regards the protamniote or Amphibian character of the stock he approaches Huxley and Howes.

H. F. O.

*"Die Phylogenese des Amnions und die Bedeutung des Trophoblastes," Verh. d. Kon. Akad. v. Weten. te Amsterdam, Dl. IV., No. 5.

GENERAL.

Thomas H. Huxley died on the afternoon of June 29th at the age of 70 years.

Charles Griffin & Co. have published the twelfth annual edition of the *Official Year-Book of the Scientific and Learned Societies of Great Britain and Ireland*, a work of reference of great value to all interested in the current advance of science. It contains details concerning the officers, place and time of meeting, publications, etc., of the various societies, and lists of the papers presented during 1894. The book bears witness to the widespread activity in all departments of science which characterizes Great Britain and Ireland.

Dr. D. Morris, Assistant Director of the Royal Gardens, Kew, in a lecture delivered before the Royal Horticultural Society, stated that, contrary to general opinion, the native plants in the Canary Islands were not dying out; they appeared, owing to their special characters, to hold their own against introduced plants and were likely to increase rather than decrease in the future. The number peculiar to the Canarian Archipelago was about 400.

About 150 members of the American Institute of Electrical Engineers were present at Niagara Falls on June 25th, to witness the trial of one of the 5,000 horse power dynamos of the Niagara Electric Power Co.

Sir Robert Ball, professor of astronomy in the University of Cambridge, England, in an article in the July number of *McClure's Magazine*, attempts to show that recent scientific discoveries tend to bear out early speculations in favor of the existence of life on other planets than the earth.

Mr. Herbert Spencer has been elected an honorary member of the Vienna Academy.

Sir B. Baker has been elected President of the Institute of Civil Engineers for the coming year.

IN the *Atlantic Monthly*, Mr. Percival Lowell, in the third of a series of papers on the planet Mars, takes up the subject of the canals and discusses their artificial appearance.

THE death is announced, in Underhill, near Matadi, on the Congo, of Mr. E. J. Glave, the African explorer.

WILLIAM C. WILLIAMSON, LL.D., F. R. S., emeritus professor of botany in Owens College, Manchester, died at London on June 23rd, at the age of seventy-eight years.

UNIVERSITY AND EDUCATIONAL NEWS.

HARVARD UNIVERSITY has this year awarded 664 degrees distributed as follows: A. B., 363; S. B., 24; M. D. V., 10; D. D. M., 17; M. D., 65; LL. B., 76; D. B., 6; A. M., 85; Ph. D., 16; S. D., 3.

AT a meeting of the board of trustees of Cornell University, June 20th, the following assistant and associate professors were promoted to full professorships: H. S. Gage, anatomy, histology and embryology; E. B. Tiechener, psychology; J. E. Creighton, logic and metaphysics; G. W. Jones, mathematics; R. C. Carpenter, experimental enginering; C. L. Crandall, civil engineering; W. F. Durand, marine engineering; H. J. Ryan, electrical engineering. John H. Barr was made associate professor of machine design.

To meet the needs of the recent reorganization of Columbian University, it is proposed to collect $75,000 to be expended at the rate of $15,000 a year. Of this amount $27,500 has been subscribed, including $5,000 each from Gardiner G. Hubbard, Eugene Levering and S. W. Woodward.

THE graduating classs of Cornell University contained 363 students. The A. M. degree was conferred on 33 candidates, Sc. D. on 6 candidates and Ph. D. on 13 candidates.

AT the commencement exercises of Smith College, on June 18th, it was announced that two sums of $5,000 each had been given to the college by donors whose names were withheld.

AT Amherst State College L. S. Metcalf has been appointed professor of mathematics, physics and engineering and G. E. Stone professor of botany.

UNION COLLEGE celebrated the one hundredth anniversary of its foundation on June 28th.

AT Williams College George A. Hunter has been appointed assistant in biology and Willis J. Milham instructor in physics.

MRS. JULIA A. IRVINE, who for a year has been acting president of Wellesley College, has accepted the office of president. The degree Litt. D. has been conferred on Mrs. Irvine by Brown University.

DR. v. KRIES, of Freiburg, has been appointed to the chair of physiology in the University of Leipzig, vacant by the death of Ludwig.

DR. NIETZKI has been appointed full professor in the University of Basel, and Dr. N. U. Assing has accepted the professorship of mineralogy in the University of Copenhagen.

DR. ERNST MACH, now professor of physics in the University of Prague, has accepted (according to *The Open Court*) a professorship of the history and theory of inductive science in the University of Vienna.

DR. M. ESCHENHAGEN, in charge of the Royal Magnetic Observatory at Potsdam, has been promoted to a professorship.

CORRESPONDENCE.

TOPOGRAPHIC METHODS.

GENERALLY speaking, sketched details of topography will compose the largest part of a map, and the question arises: How are such interpolations best made to produce accurate as well as uniform and artistic results?

The expert topographer, intuitively, separates minor features of the surrounding terrene from those accidents of the ground which characterize forms that may not only be represented in the scale of the map, but which will also materially assist in delineating and representing the general system that may condition such forms. Where the general configuration or surface-modeling conforms to an easily recognizable system, a broader interpretation and a more free treatment of the terrene should be observed than in the case of an area showing diversified forms and having an irregular relief.

Topographic sketching in this sense not only requires artistic sensibilities, but it also demands a correct and comprehensive interpretation of forms, under a supposition which is at variance with the facts, inasmuch as the map is drawn as if the terrene were seen from a point at infinite distance.

The question now arises: How is the young topographer to be best prepared in order to meet the requirements with general satisfaction?

My views fully coincide with those of Professor Davis, given in a recent note in Science, that 'a very careful and sympathetic study of the origin of land forms on the ground before the topographer' will enable him to 'make less mistakes of interpretation' than one whose principal aim is to give mathematically correct locations without possessing any knowledge of either terrene forms or the agencies which produced them.

Mathematical knowledge in surveying is, of course, a *sine qua non*, but the study of terrestrial relief and the orthogonal projection of the latter into horizontal plan should be made a careful study, and to this the young topographer's attention should be principally directed, guarding him, however, against falling into that error which a thorough familiarity with structural geology and a knowledge of its originating causes are apt to commit, namely, never to represent on the chart imaginary forms of topographical elements that are not visible from the occupied stations in the field. In other words, the topographer should not, on the strength of a familiarity with structural geology, attempt to sketch the contours on the further (invisible) slopes of hills merely by inference, or, because the contours delineating the visible slopes before his eyes may be well determined, and, in a measure, may suggest the probable shape of the further sides.

I believe with Professor Davis, that "the best course of education for topographers, while yet in school, should include a careful study of the development of land forms," which may be done in various ways.

A 'comparative' study of relief-models with two sets of topographic maps (all on a large scale) of the same area—one set with hill-shading and the other with horizontal equidistant contours—together with a series of panoramic views, covering the same area and taken with a surveying camera, would probably give the student not only excellent means for comparing the 'representative force' of the various conventional methods of indicating topographic forms, but an intelligent comparison of the maps and model with the photographs (or with nature) would train the young topographer into seeing the facts, and he would thus make a good start towards acquiring facility in sketching topographic forms of the terrene spread out before him.

A course of 'iconometric' platting, on a large scale, from photographic perspectives (metro-photography), would also offer an excellent opportunity, not only to demonstrate how the elements selected as characteristic points in the landscape are interpreted or transposed into horizontal plan, but such a course would also offer the student the means to clear any doubt he may have regarding the transposed forms of

features before his eyes, by constructing the orthogonal projection of such features, graphically, in a simple manner, from their perspective views.

J. A. FLEMER.

WASHINGTON, D. C.

THE METEOROLOGICAL AND MAGNETICAL OBSERVATORY ZI-KA-WEI, NEAR SHANGHAI, CHINA.

THE Zi-ka-wei Observatory, founded in 1873 by the French Roman Catholic Mission of Kiang-nan, has been provided by the same with all the instruments necessary for the study of meteorology and terrestrial magnetism, and from that time it has not ceased to pursue actively the study of those two branches of science. The work of the Observatory comprises 3 parts:

(1) The first part is a public service accepted out of good will; and it may be said gratuitously, in behalf of the port of Shanghai. This manifold service includes: the service of the time-ball by which the exact time is given to the port of Shanghai by the fall of a meridian ball; a daily bulletin, posted up at Shanghai, contains information on the weather at Shanghai and along the coast of China; the typhoon and storm warnings by means of signals hoisted up at a semaphore. (2) The second part of our work is composed of hourly meteorological and magnetical observations published in monthly bulletins, which make at the end of each year a volume in.-4to of over 200 pages. (3) The third part comprises special studies on meteorological or magnetical subjects, the whole of which comprises already 26 memoirs.

But up to the present the study of astronomy has been altogether left aside. When the service of the time-ball was inaugurated at Shanghai, twelve years ago, by the care of the Municipal Council of the French Settlement, the Observatory received, at the expenses of that Council, a little transit instrument, good for the determination of the time, but altogether inadequate to astronomical observations properly so called. This absence of instruments fit for astronomical studies we have seen it regretted by many learned men. To quote but one only, Mr. A. Tissandier, relating in *La Nature No. 944* his visit to the Zi-ka-wei Observatory, expressed his regret of seeing us neglecting astronomy. Our too limited staff had prevented us till now, just as much as the lack of pecuniary means, to think seriously about giving to our Observatory a so-eagerly-longed-for development. At present we would be in a better condition even to undertake a series of studies in that so interesting branch of science. But it is quite impossible that the Catholic Mission, which has made so many expenses to found the Observatory and maintain it in its present state, make to itself the expenses for such an establishment. It is even impossible that it can suffice for the cost of the instrument which we wish to set up in the first place, *i. e.*, an equatorial telescope of becoming size. We must then necessarily have recourse to the generosity of those interested in the advance of science and particularly in the studies made at Zi-ka-wei. The city of Shanghai profiting above all by our work, it was then quite natural that we first of all address ourselves to it. And that we have done in demanding from the two Settlements (English and French) to be so kind as to contribute each for a sum of £400 to the setting up of an equatorial telescope at the Zi-ka-wei Observatory. That proposal, brought before the meeting of the Ratepayers of the English Settlement on the 12th March by Mr. G. J. Morrison and seconded by Mr. J. Henningsen, has been received with the marks of the greatest sympathy and voted unanimously.

A similiar reception of my demand has been made at the meeting of the French

Municipal Council on the 1st of April, and the Council granted likewise a sum of £400 to the Observatory for the same end. Besides, the shipping companies established at Shanghai have promised to subscribe for the same purpose a sum, the amount of which their agents have not been able to fix immediately, but the sum total may, perhaps, be equivalent to £400. But this sum of £1,200 will be very little for an equatorial teleseope of convenient size, for instance of an aperture of 20 inches; very little especially for a complete astronomical observatory.

I have made up my mind to address myself to all those to whom the Lord has distributed, together with fortune, the love of science and the desire of utilizing for its advance the fortune they possess. It is to them to whom I make application, begging them to be so kind as to contribute, according to the pecuniary means they may dispose of, to that development of the Zi-ka-wei Observatory. I am aware that to solicit thus of the public a subscription in favor of a private institution, it would be necessary to be able to present simultaneously titles to the benevolence and guarantees that the solicited money will be usefully employed for the proposed end. But the Zi-ka-wei Observatory can present, I believe, both. Its titles to the benevolence it is its past, and its work of which I have spoken about above; titles which, as it has been seen, are far from being denied by the community of Shanghai. The said work constitutes also, I presume, the best guarantee that the asked-for money will be usefully employed. My claim, being founded on these considerations, I dare hope that my request will be received kindly and that numerous benefactors will be willing to help us to succeed in this useful undertaking.

Stanislas Chevalier S. J.
Director of the Observatory.

Zi-ka-wei, near Shanghai, 8 April, 1895.

SCIENTIFIC LITERATURE.

The Royal Natural History. Edited by Richard Lydekker. Vol. III., pp 596. Royal 8°. 1894–1895; Frederick Warne & Co., London and New York.

Volume III. of this important work has just reached America. The first half is devoted to Mammals; the second to Birds. The groups of Mammals treated are the Cetaceans, Rodents, Edentates, Marsupials and Monotremes, thus concluding the class. One hundred and thirty-six pages are given to the Rodentia—the most difficult order of all. That this chapter is the best popular account of the group yet written goes without saying, though in numerous details it is sadly behind the present state of knowledge, particularly with reference to American forms.

In describing the molar teeth of rodents the author forgot the *Geomyidæ* and *Aplodontia* when he said: 'permanently-growing rootless molars *always* have complex crowns.' But he made a happy comparison, and one easily remembered, respecting the parallelism between the molar teeth of rodents and of the mastodons and elephants, "the molar tooth of a mouse, which has distinct roots and a low crown with simple cusps, being exactly comparable to that of a mastodon; whereas the high crowned laminated and rootless molar of a guinea pig corresponds as closely with that of a modern elephant."

In describing the coloration of the group as a whole he says that no rodent has 'the tail ornamented with alternate light and dark rings,' forgetting the handsome Mexican ring-tailed ground squirrel (*Spermophilus annulatus*) described by Audubon and Bachman half a century ago.

His ideas of the American chipmunks are hopelessly mixed. He says that southern specimens of the common eastern *Tamias striatus* are 'lighter in color than those from the north.' The reverse is the case. In the same paragraph a California species is

mentioned under the name *T. macrotus*—an animal unknown to American mammalogists, and it may be added that no representative of the eastern chipmunk occurs in western America. Then, turning to the western chipmunks, which he regards as varieties of the Siberian *T. asiaticus*, he says: "The Siberian chipmunk ranges in North America from Lake Superior and the neighborhood of the Barren Grounds to New Mexico and Arizona, and extends from the Atlantic to the Pacific seaboard." This is a mistake, as no member of the group in question approaches the eastern States; and if Mr. Lydekker could see a dozen of our American species (without reference to the subspecies) I am sure he would never again think of them as 'varieties' of the Siberian animal.

The ground squirrels of the genus *Spermophilus* (which by the way is antedated by *Anisonyx*, as already pointed out in this journal, SCIENCE, I., 1, Jan. 4, 1895, p. 18), are said to 'have very nearly the same distribution as the chipmunks.' But in America considerably more than half of the numerous species are desert animals, living where chipmunks never go. It is also stated that nearly all the American species have long tails, whereas more than half of them have short tails.

Our 'prairie dogs' (*Cynomys*) are called 'prairie marmots,' a much better name, but one it would be exceeding difficult to bring into general use. Only three species are recognized (instead of four), the two of the Rocky Mountain plateau (*gunnisoni* and *leucurus*) being confounded under a name belonging to neither, namely, *C. columbianus*. This name, as shown several years ago, belongs to a ground squirrel or suslik inhabiting northern Idaho and parts of Canada.* The distribution given for this imaginary animal (made up of two genera and three species) is equally remarkable, for it is said to range from the 'Columbia through Colorado and Arizona to the Sierra Nevada.' No species of the genus *Cynomys* occurs anywhere in the Columbia region, or in the Great Basin; and no species comes nearer than about 400 miles of the Sierra Nevada. The account of the habits quoted from Lewis and Clark relates exclusively to the northern suslik (*Anisonyx columbianus*).

In the case of the true marmots (*Arctomys*), as in the prairie marmots, only 3 species instead of 4 are recognized—the Rocky Mountain and Sierra-Cascade species being confounded under the name *flaviventer*. The name given for the Arctic-Alpine hoary marmot, *pruinosus*, is antedated by *caligatus*.

The jumping mouse (*Zapus*) is said to range from Great Slave Lake and Hudson's Bay to Arizona and Mexico. It has been found in the mountains of Colorado, but I am not aware of a record for Arizona or Mexico.

The American white-footed mice, of which there are several genera, are all lumped with the European Hamsters in the genus *Cricetus*.

Our wood rats (*Neotoma*), of which about 25 species are known, are spoken of as 'a small genus!' The lemmings, singularly enough, are interposed between the voles (*Microtus*) and *muskrat* (*Fiber*). Had Mr. Lydekker compared the skull of *Fiber* with that of *Microtus amphibius* it is doubtful if he would have recognized it even as a subgenus.

In characterizing the family of pocket gophers (*Geomyidæ*) the same mistake made in *Flower and Lydekker's Introduction to the Study of Mammals* is repeated, namely, the supposed anterior extension of the cheek bone of jugal. Some remarkable things are said concerning the burrows of these animals.

The 'common Kangaroo rat,' "which inhabits the desert regions to the eastward of the Rocky Mountains," is said to be *Dipodomys phillipsi*. This is perpetuating an old

*N. Am. Fauna, No. 5, July, 1891, pp. 39–42.

error. *Dipodomys phillipsi* does not occur in the United States at all, but in southern Mexico, as pointed out long ago by the reviewer; the only members of the group inhabiting the plains east of the Rocky Mountains belong to the allied genus *Perodipus*. We are told that "Probably the only water these creatures drink is that derived from dew collected on the cactuses." The author may be surprised to hear that dew does not form in the American deserts where Kangaroo rats live, and that these animals, like most other desert rodents, do not drink.

Maximilian's pocket mouse (*Perognathus fasciatus*), which, although unmarked, is called 'the banded pocket mouse,' is said to be 'characterized by the hair being coarse and bristly.' On the contrary, the hair is soft and silky; the only species having stiff hairs belong to another subgenus (*Chætodipus*).

Only one pika (*Lagomys*) is credited to North America, though at least three are recognized by American mammalogists.

In describing the habits of rabbits it is stated that all the members of the family, except the European rabbit and the hispid hare of northern India, 'dwell either in open country among grass and other herbage, or among rocks and bushes,' forgetting that the common varying hare (*Lepus americanus*) lives in the dense coniferous forest that stretches across the American continent from Labrador and northern New England to Alaska.

After the lumping that characterizes so much of the book, particularly with respect to American mammals, it is refreshing to find that the author, following Lilljeborg, recognizes the common hare of Europe as a distinct species (under the name *Lepus europæus* Pallas) from the mountain hare (*Lepus timidus* Linn.) of Scandinavia and the higher elevations of Europe.

It is also pleasing to note that the author gives the weight of his high authority to the view that the Old World pangolins and aard-varks probably do not properly belong among the Edentates. The name of the great anteater will probably have to be changed from *Myrmecophaga jubata* to *M. tridactyla*, the latter being used by Linnæus in the 10th edition of the *Systema Naturæ*, 1758. The chapter on the Edentates is of special importance, as are those on the Cetaceans, Marsupials and Monotremes.

An important and in every way praiseworthy feature of the work is the brief notice of extinct forms given at the end of each chapter. These, coming from a man of Lydekker's rank as a paleontologist, may be taken as authoritative summaries of the present state of knowledge of fossil mammalia.

Curious liberties have been taken, intentionally or otherwise, in the spelling of generic and specific names, as *Rhithrodontomys* for *Reithrodontomys*, *Haplondon* for *Aplondontia*, *Speotito* for *Speotyto*, *capivara* for *capybara*, *husdonianus* for *hudsonicus*, and so on. By an unfortunate slip some quotations from the well-known naturalist, J. A. Allen, are attributed to the California bird collector, C. A. Allen.

The illustrations, most of which are from Brehm, as explained in the previous review, cannot always be taken as correct likenesses. For instance, the 'common chipmunk,' on page 78, looks like Say's ground squirrel with the tail of a mongoose; and in the picture of prairie dogs, or prairie marmots, on page 82, the two large animals are certainly not *Cynomys*, but *Arctomys*, and the smaller ones might be anything. The muskrat and pika also are very unlike the animals they are intended to represent.

The work as a whole, while designed for a popular audience and bearing marks of hasty preparation, is nevertheless of much value to professional naturalists, particularly the chapters treating of groups that have been personally studied by the author

—as the Cetaceans, Edentates and their allies, and others. While it has been deemed useful, especially in an American review, to point out the most conspicuous errors in the treatment of the American members of the perplexing order Rodentia, it must not be supposed that other parts of the book are equally open to criticism. In reviews it is both proper and desirable to point out erroneous statements, while, from the nature of the case, like detailed comment respecting the good qualities is well nigh impossible. Hence notices of very good books often seem to consist mainly of adverse criticism. I fear this is true in the present instance.

The bird part of the Royal Natural History will be reviewed separately.

C. H. M.

Lehrbuch der Biologie der Pflanzen. FRIEDRICH LUDWIG. Stuttgart, Verlag von Ferdinand Enke. 1895. 8°, pp. vi + 604, with 28 figures in the text.

The Germans are quite persistent in refusing to recognize as biology the mixture of botany and zoölogy, which is rather unfortunately called biology by the English and Americans, and as a general thing they designate by the latter name the relations of plants to their surroundings, a subject that the Madison Congress of American botanists agreed to call ecology. It is, therefore, to this subject that Professor Ludwig's latest book refers, and it includes chapters on the adaptations of land and water plants to their surroundings, adaptations to a parasitic habit of life, the part played by fungi in the nutrition of higher plants, carnivorous plants, commensalism and symbiosis, adaptations of plants to the physical and chemical character of the soil, climbing plants, phenology, the various protective devices met with in plants, the many interesting arrangements concerned with pollination and dissemination, and the influence of man on the forms of plants, with which is connected a general discussion of heredity and the causes of variation from hereditary types.

Dr. Ludwig is an earnest student of the relations of plants to their surroundings, especially of their adaptations to pollination by insect agency, and his book appears to be not only pleasantly written, but accurate in its statement of fact.

WM. TRELEASE.

A Monograph of the North American species of the genus polygonum: By JOHN KUNKEL SMALL. Memoirs from the Department of Botany of Columbia College, Vol. I. Issued April 23, 1895. 4°. pp. 183, Pl. A. and 84. Price $6.00.

While it is generally believed that the classification and naming of plants is a less advanced branch of botanical investigation than the study of their morphology, development and physiology, botany would be a very crude science, indeed, without such work, and one of the duties that fall to the possessors of every large herbarium is that of monographing difficult groups—a duty all the more imperative because of the undeniable fact that such work can only be done where good library and herbarium facilities are at hand.

The botanical department of Columbia College, with one of the finest herbaria and systematic libraries in the country, is apparently fully aware of this fact, and at frequent intervals Dr. Britton and his assistants and special students publish revisions that are helpful to all systematic students of the North American Flora. The last of these publications inaugurates a series of Memoirs which promise to reflect much credit on the institution under the auspices of which they are published.

No collection in the world contains more valuable material for a study of the North American Knotweeds than is to be found at

Columbia, which possesses the herbarium of Meisner, the last general monographer of the genus, and to this has been added the choicest of the other collections of the country. While Mr. Small has done no small amount of field work on some of the forms, the result appears to be worthy of the facilities he has enjoyed, though, like all monographic essays, its strength or weakness must be tested by practical use. Keys to the sub-genera and to the species under each of these, and plates representing the habit and the more essential details of each species, render the work easy to use, and the anatomy of representatives of the several groups has been comparatively studied and largely illustrated. In appearance the monograph is good, and the plates are clearly drawn and well printed, though a little flat and harsh—a defect that the artist will doubtless overcome in future work.

Wm. Trelease.

The Geological and Natural History Survey of Minnesota. The Twenty-third Annual Report, for the year 1894. N. H. Winchell, State Geologist. Minneapolis, Harrison & Smith, State Printers. 1895. 8vo. 255pp.

This survey has kept steadily on its way for many years, under the able direction of Professor Winchell, who gives us annually a volume in which matters of practical importance to the people of Minnesota and questions of general scientific interest alike find efficient treatment.

In the present volume, after a summary statement of the year's work of the Survey, Professor Winchell, in Part II., discusses the Origin of the Archæan Greenstones of Minnesota. This paper is of the nature of a review of Bulletin No. 62 of the U. S. Geological Survey on the Greenstone Schist areas of the Menomee and Marquette Regions of Michigan, by Dr. George H. Williams, in which the tendency of the conclusions reached by Dr Williams is to refer the greenstones as a body to dynamic metamorphism of massive eruptive rocks, while a sedimentary origin is not denied to a part of them. Professor Winchell skilfully arrays the facts, both megascopic and microscopic, in support of his own view of the origin of these greenstones, and would reverse the main conclusion of Dr. Williams as to the comparative amounts of the two sorts, massive and sedimentary. His conclusions are given in the following words: "We look upon the greenstones in Minnesota as an oceanic terrane having a definite stratigraphic position (the uppermost part of the Keewatin), although probably involving some truly irruptive masses. Its materials, both basic and acid, are interbedded by sedimentation the one with the other, and are sometimes mingled. The decayed condition of these materials is due to the natural action of the Keewatin ocean prior to consolidation, and the crystalline condition of the lower beds is due to later metamorphism which, having its active forces and seat at greater depths, did not permeate the whole formation. It is not attributable so much to dynamic movements as to internal heat. Wherever such movements operated with much violence, the lower Keewatin sediments were fused, producing irruptive felsytes and granite. Such granite is bordered usually by belts of crystalline schist, evidently formed at the time of such fusion."

Part III. is devoted to a preliminary report on the Rainy Lake Gold Region, by H. V. Winchell and U. S. Grant, in which, after an introductory part on the occurrence and associations of gold ores, and a historical sketch of the gold discoveries of this region, the body of the report is devoted to the general features and geology of the area and a more detailed account of individual properties. Most of the gold-bearing rocks of this district belong to the *Keewatin* di-

vision of the Archæan of the Minnesota Survey, which would correspond with the Upper Algonkian of the U. S. Geological Survey. The gold occurs (1) in segregated veins, (2) in fissure veins and (3) in fahlbands.

The segregated veins seem to resemble in all respects the veins which carry the greater part of the gold in the Appalachian region, at least, from North Carolina to Alabama. The quartz of these veins in lenticular masses is disposed in irregular belts from one to ten or more feet in width, which are roughly parallel with the lamination of the enclosing slates, and it is often the case that the gold is also found in the quartzose rock immediately enveloping the lenses. This agrees well with what has been noticed in the Southern Appalachian fields; and in the prospects of the Rainy Lake area as a gold-producing region there is also a close agreement with what has recently been given out as the conclusion of Prof. Becker regarding the Southern Appalachians, viz., that while the winning of the gold will probably never be of the nature of a bonana, yet it will, if properly managed, yield a good interest upon the money invested. Apart from the gold-bearing veins, the resources of this region most to be counted upon for future development are (1) the excellent farming lands, (2) the large bodies of good timber, (3) the large water power and (4) the probability of the existence of valuable deposits of iron ore.

Part IV. is a well considered paper by W. R. Hoag, on the Advantages to be Derived from a Topographic Survey of the State. In Part V. Professor Winchell gives a historical sketch of the Discoveries of the Mineral Deposits of the Lake Superior Region, including some interesting details of the prehistoric mining in the copper regions. In this sketch attention is called to the important fact that the majority of the metalliferous belts were discovered by official geologists in the performance of their assigned duties. Among these discoverers the name of Dr. Douglass Houghton stands preëminent.

Part VI., by Mr. Warren Upham, is in continuation of an investigation published in the preceding report of this survey, and relating to the glacial lakes which are now succeeded by the present great Laurentian lakes. The author brings forward evidence to prove the pre-glacial elevation of North America, the late glacial subsidence, and the reëlevation by a wavelike epeirogenic uplift. The measurement of post-glacial time by the recession of Niagara Falls is also fully discussed, the conclusion reached that the estimate of 7,000 years, made by Gilbert in 1886, accords best with the facts observed. The paper ends with a tabular presentation of the epochs and stages of the glacial period, using the nomenclature proposed by Professor Chamberlin.

The rest of the volume is devoted to notes upon some Minnesota minerals, to chemical analyses, lists of rock samples, etc., without general interest, except some notes by Professor Winchell upon the bedded and banded phases of the gabbro of northeastern Minnesota.

EUGENE A. SMITH.
UNIVERSITY OF ALABAMA.

FOLK-TALES.

Le Folklore Dans Les Deux Mondes. Par LE CONTE H. DE CHARENCEY. Paris, C. Klincksieck. 1894. Pp. 424.

Louisiana Folk-Tales. In French Dialect and English Translation. Collected and Edited by ALCEE FORTIER, D. Lt. Houghton, Mifflin & Co. 1895. Pp. 122.

The work of M. de Charencey forms the twenty-third volume of the 'Actes de la Sociétè Philologique,' a society, by the by, which in its various issues presents a great deal of value on American languages. The author, well known for his numerous and erudite writings, here takes up a series of

myths and folk-tales which are found in tribes and nations widely asunder in time and place, and points out the traits which he believes to be original, and those he considers assignable to contact. The majority of them are either American or represented in America. The longest, 135 pages, is that which he calls 'Lucina sine concubitu,' *i. e.*, the Myth of the Virgin-Mother. As he shows, this is a very common tale repeated with slight variations in the New and Old World. Another of special interest is that of the subterranean origin of the human species, which is connected with the flood-myth and various cosmogonical legends. Other chapters are devoted to 'The Origin of the Sun,' 'Dog-Men,' 'The Myth of Psyche in America,' 'The Discovery of Maize,' 'The Name of the Metals in the Languages of Mexico,' etc.

The learning of the author is everywhere manifest and also his familiarity with original sources and native languages; but to one who believes in the modern anthropologic school of folk-lore his constant effort to trace connection and dependence between myths of distant nations will prove disappointing. He is a firm believer in the fanciful theories about early American culture advanced by the late M. Leonce Angrand, who maintained there were two currents of civilization, one the 'Floridian or eastern Toltecs,' the other the 'western Toltecs'; the former from southern, the latter from central or northern Asia. No tenable arguments support this hypothesis, and its introduction into a work of original research, such as this, is a misfortune.

Professor Fortier's volume is the second of the 'Memoirs of the American Folk-lore Society.' It consists of fourteen animal tales, twelve fairy tales or märchen, and an appendix of fourteen short stories in English only. Some brief notes accompany the text, mentioning the source or informant. Most of the tales can readily be traced to European originals, which have become modified by the local surroundings. The few exceptions to this are possibly African, but the negroes in the United States seem to have lost early and completely both their language and folk-lore. The volume is also valuable for its examples of the true Creole dialect. This is now disappearing, and Professor Fortier found it no easy matter to obtain these narratives, the younger generation knowing nothing of them and the older being desirous of forgetting them.

The translation is generally very satisfactory; though in such renderings as 'alors pove fille la di,' by, 'the young lady said to herself,' greater simplicity would have been preferable.

D. G. Brinton.

The Second Law of Thermodynamics. Professor Oliver J. Lodge, Proceedings, Liverpool Engineering Society, December, 1894, twenty-first session, with discussion.

Professor Lodge, in this discussion, begins with the statement that the Second Law of Thermodynamics asserts that the proportion, range of temperature worked through by a heat engine divided by initial maximum, absolute temperature, represents the largest proportion of the heat present in the working substance in any cycle of thermodynamic action which can be, by any means, converted from the thermal form of energy to the mechanical or dynamic, and proceeds to show that "the second law of thermodynamics is, after all, nothing more than enlightened common sense." The deduction is immediate and obvious that the higher the temperature the greater the availability of the heat, and the larger the proportion which may be converted into the other form of energy in any thermodynamic cycle. The drop of temperature between firebox and boiler, for example, means an absolute loss of availability of heat, in the

proportion of the difference between the final range between the boiler and atmosphere or other lower limit of temperature and the range between the firebox temperature and the same lower limit. If the absolute furnace temperature is 2000° C., boiler temperature 500° C., and condenser temperature 350°, for example, the availability of the heat generated by combustion is reduced at the first step from (2000–350) /2000 = 0.825 to (500–350) /500 = 0.30; even though the most perfect of thermodynamic engines is employed.

"But though the second law is scientifically precise and incontrovertible, it is hard at first to realize how and why it can be true that the temperature which exists in bodies so entirely controls its availability or working power." This the author proceeds to explain by reference to illustrations in other fields of energetics. The deduction follows:

"The transferable portion of heat is to the whole heat as the available difference of temperature is to the whole temperature above absolute zero. Hence the efficiency of transfer is equal to the ratio of the available difference of temperature to the maximum absolute temperature."

This is Professor Lodge's enunciation of the second law of thermodynamics. It follows that "A working substance above average pressure has some available mechanical energy; a working substance below average temperature has some available thermal energy, but a substance at average pressure and temperature has no available energy."

"The second law of thermodynamics relates to the utilization of heat energy *as heat*, *i. e.*, as irregular and uncontrollable molecular motion. If, by any means, molecular motion could be taken under control, it would cease to be heat—the second law of thermodynamics would not apply to it—and a much greater portion of its energy might become available." Thus "Animals do not turn their food energy into heat, but utilize it direct. They are not heat engines. If they were, they would be miserably inefficient because of their low temperature; but they are chemical engines, analogous to the electric battery and are marvellously efficient."

A working substance, for use in any heat engine, must have the following qualifications to insure efficiency:

1. It must have great capacity for heat.
2. It must be able to sustain high temperature.

By utilizing the whole difference of temperature between the furnace and the surrounding bodies, any heat engine, as, for example, the gas engine, is seen to involve, according to the laws of thermodynamics, a possibility of raising the efficiency of the heat engine, "not five or six per cent., which is almost all the present difference between the best steam engines and the worst, but to a revolutionary change of fifty or sixty per cent; no drop of temperature being permitted from furnace to everyday temperature, without delivering up its due equivalent of motive power."

R. H. T.

SOCIETIES AND ACADEMIES.

ALABAMA INDUSTRIAL AND SCIENTIFIC SOCIETY.

THE annual meeting of this Society was held in Birmingham on the 8th instant. The officers elected for the ensuing year are Mr. Thomas Seddon, President, and Messrs. E. A. Uehling and C. E. Bowron, Vice-Presidents; Messrs. Eugene A. Smith and Henry McCalley were continued as Secretary and Treasurer respectively. The retiring President, Dr. Wm. B. Phillips, in his address before the Society, gave some particulars of the experiments conducted by him in Bessemer for the concentration of the Red Mountain (Clinton) ores. This

concentration is effected by making the ore magnetic by roasting in a suitable furnace in contact with producer gas, then after crushing to small size passing it over a magnetic separator, when the silica is thrown off and the iron ore remains to fall into a bin. The experiments have been carried far enough to demonstrate the fact that concentration may be carried out which will make available the stratum of ore hitherto thrown aside as too high in silica for profitable working. The carrying out of this process on a commercial scale would mean a great deal for the Birmingham district.

The subject set for discussion at this meeting was the utilization of the by-products of the coking ovens, and on this Mr. A. J. Montgomery read a paper of much interest. The next meeting of the Society will be held in the autumn.

Eugene A. Smith,
Secretary.

ST. LOUIS ACADEMY OF SCIENCE.

The Academy held its regular meeting on June 17th, with President Green in the chair and 25 members and visitors present.

Dr. C. R. Sanger spoke of the Chemistry of Photography, dividing his discourse into the following headings: (1) The Formation of the Latent Image. (2) The Development of the Latent Image. (3) The Fixation of the Developed Image. (4) The Printing of the Positive. (5) The Toning of the Positive.

Adjourned until the third Monday in October.

A. W. Douglas,
Recording Secretary.

SCIENTIFIC JOURNALS.

THE AMERICAN JOURNAL OF SCIENCE.

The July number of the *American Journal of Science* commences the fiftieth and closing volume of the *third* series; it is the one hundred and fiftieth volume since the Journal was established in 1818. The opening article is by Frank Leverett, on the Correlation of New York moraines with raised beachs of Lake Erie. The investigation here detailed is in continuation of the work earlier done by the same author (the results published in 1892) in tracing the connection between the raised beaches of the western portion of the Erie basin and certain moraines in Ohio. It is a department in which G. K. Gilbert had also made extensive investigations previous to this time, notably in 1886. The names given to the successive beaches are those suggested by Mr. Gilbert, viz., the upper or Sheridan Beach, traced by Gilbert from Cleveland eastward to Sheridan, N. Y., which may be a continuation of the western Belmore Beach and the lower Crittenden Beach, especially investigated to the eastward near Hamburg. A map is given by Leverett, of the region under discussion, showing the position of the beaches and the moraines and other related features exhaustively treated in this article. The author reaches some important conclusions, which, however, hardly admit of brief statement; one point made relates to the successive outlets of the lake during the glacial times. A paper by H. L. Wells describes, as a continuation of former work in a similar subject, two remarkable chemical compounds containing lead and extra iodine. These are Johnson's salt for which the formula $5Pb\ (CH_3\ CO_2)_2\ .3KI\ .6I$ or perhaps $5Pb\ (CH_3\ CO_2)_2\ .3KI_3$ is deduced and Gröger's salt with the formula $PbI_2.PbO.3I.H_2O$.

Two papers on analytical chemistry come from the laboratory of F. A. Gooch, the first embodying the results of work by himself and Charlotte Fairbanks in the estimation of the halogens in mixed silver salts, and the second with C. F. Clemons on the determination of selenious acid by potassium permanganate. S. F. Peckham, in a paper upon the Pitch lake of Trinidad, de-

tails the results of a visit to that remarkable spot in the spring of 1895. In this connection he gives an interesting review of early descriptions of the same region, commencing with that of Anderson in 1789, also Nugent in 1807, Alexander in 1832, Manross in 1855 and others later. The paper is accompanied by several sketch maps which give definiteness to the description. J. C. Merriam describes some reptilian remains from the Triassic of northern California, of much interest in view of the fact that the Mesozoic of California has thus far yielded so little in this direction. The remains studied represent two individuals from the black Triassic limestone of Shasta county. The first, consisting of eight vertebræ, some fragments of ribs and both coracords, receives the same *Shastasaurus pacificus*. In the second, the remains consisted of some twenty-five vertebræ, mostly anterior caudals; these resemble those of Ichthyosaurus, but in certain particulars, as in an ungrooved single-headed rib, it agrees rather with the new genus established, Shastasaurus. The material, however, was insufficient for specific characterization. The concluding article of the number is a discussion by Frank D. Adams, of the Laurentian of Canada, accompanied by two plates. The region, the study of which has yielded the results here concisely presented, is shown in Plate I. It lies to the north and west of Montreal and the St. Lawrence river, and is largely occupied by the crystalline schists of the Grenville Series with subordinate masses of the "Fundamental Gneiss" and a number of anorthosite intrusions. The stratigraphy and petrography are both discussed, and the latter is supplemented by a series of analyses of typical gneisses and slates. The author concludes that in the district under consideration there are "at least two distinct sets of foliated rocks. One of these, comprising limestone, quartzites and certain garnetiferous or sillimanite gneisses, represents in all probability highly altered and extremely ancient sediments. The other set intimately associated with these are of igneous origin, and comprise numerous and very extensive intrusions, both acid and basic in character, which were probably injected at widely separated times." * * * * "The Grenville Series therefore comprises certain primeval sediments which have been deeply buried, invaded by great masses of igneous rocks and re-crystallized. They may, perhaps, in some cases have been mingled with these igneous masses by actual fusion. The whole complex has also been subjected to great dynamic movements. In this way has resulted a series of rocks whose original character cannot in all cases be deciphered, but which can be recognized as being of composite origin, the sedimentary portion representing extremely old, if not the oldest, sediments with which we are acquainted."

AMERICAN CHEMICAL JOURNAL.

THE number for June contains a number of short contributions from various laboratories, and several reports. Gomberg contributes an article on the action of inorganic cyanides on chlorocaffeine. He found that when chlorocaffeine was treated with potassium cyanide he obtained neither the cyancaffeine nor the amidocaffeine, as he expected, but caffeine carboxylamide. The cyancaffeine is produced in the reaction, but only as an intermediate product, being converted, by saponification, into caffeine carboxylamide. The reaction can be represented thus:

$$C_5(CH_3)_3ClN_4O_2+KCN=C_5(CH_3)_3(CN)N_4O_2+KCl$$
$$C_5(CH_3)_3(CN)N_4O_2+H_2O=C_5(CH_3)_3(CONH_2)N_4O_2$$

By the action of phosphorus pentachloride on this compound one molecule of water is removed and cyanocaffeine is formed.

$$C_8H_9(CONH_2)N_4O_2—H_2O=C_8H_9(CN)N_4O_2$$

This was found to be the best method for the formation of cyanocaffeine, for all at-

tempts to replace the chlorine by the cyanogen group by treatment with potassium cyanide under various conditions were only partially successful. The acid amide was converted into caffeine carboxylic acid and a number of salts were prepared and studied. All the compounds could be explained by the accepted structure for caffeine.

Shober and Kiefer describe the results of a series of experiments on the decomposition of metadiazobenzene sulphonic acid. They find that this acid when boiled with methyl, ethyl and prophyl alcohols, at different pressures, gives both the methoxy and hydrogen reaction, while the corresponding para compound gives only the hydrogen reaction. Kastle and Keiser have a paper on the colorimetric determination of the affinity of acids by means of potassium dichromate. The reaction depends upon the fact that when a solution of potassium dichromate is treated with a solution of sodium acetate or the sodium salt of other acids, the base is equally distributed and the normal chromates are formed. They used as a standard a solution of potassium dichromate to which a solution of tenth-normal sodium hydroxide was added until an equal color was obtained. They could determine the amount of decomposition and, assuming the affinity of potassium dichromate as 1, could calculate the relative affinities of the acids. For many of the acids the results agree fairly well with those obtained by Ostwald; but for some acids the method could not be used. Mixter gives the methods of preparation and properties of some azo and azimido compounds, and Noyes contributes another article on camphoric acid. He finds that in the formation of campholytic acid, from di-hydroamino-campholytic acid, by the action of nitrous acid, another acid is formed, whose reactions, along with other facts, furnish strong proof that the carboxyl groups of camphoric acid are combined with adjacent carbon atoms. He considers the two isomeric campholytic acids to be stereoisomeric.

An article by Wheeler contains a description of benzimidomethyl ether and its action on aromatic ortho compounds. No new compounds were obtained, as the reactions took place differently from what he expected.

Curtiss has repeated some of Nef's work on the action of ethyl iodide on silver acetylacetone

$$\begin{matrix} CH_3.\ CO\ Ag \\ HC.\ COCH_3 \end{matrix}$$

and explains the formation of two products by the assumption that the molecule has two points about equally susceptible of attack, namely, the silver atom and the double bond between the two carbon atoms. The ethyl, therefore, replaces the silver directly, or the ethyl iodide is added to the doubly bound carbonatom. He has also shown that Claisen's objection to Nef's statement, that oxymethylene compounds and acetacetic ether, in the free state, show close analogy, does not hold, as he has obtained an ester by the action of dry hydrochloric acid gas on acetacetic ether in alcohol. Randall contributes a report of articles by Ramsay on 'The molecular complexity of liquids.' This number also contains obituary notices of James A. Dana, Lothar Meyer and Gerhard Krüss.

J. Elliott Gilpin.

NEW BOOKS.

Fingerprint Directories. Francis Galton. London and New York, Macmillan & Co. 1895. Pp. 123. $2.00.

Annual Report of the Department of Health of the City of Chicago. Arthur R. Reynolds. Chicago. 1895. Pp. lix+268.

A Text Book of Physiology. M. Foster. New York and London, Macmillan & Co. 1895. Pp. xlviii+1183. $5.00.